Robot Thought Evaluation Summary

1 Introduction

Robot Thought was delivered by the University of the West of England, Bristol (UWE) in partnership with seven science centres, a science festival and four robotics research groups. The project was funded by the Engineering and Physical Sciences Research Council (EPSRC). This brief report summarises the evaluation findings of the eight robotics shows developed and delivered across the UK during 2006/07.

Further information about the project is available from: http://www.scu.uwe.ac.uk/projects/events/robot_thoughtII.htm.

Individual evaluation reports for each stage of the project are available from: http://www.scu.uwe.ac.uk/projects/evaluations/robot_thoughtII.htm

2 The project

2.1 Project description

'Robot Thought' is a fully-interactive dialogue event aimed at family audiences, designed to challenge and stimulate public thinking about the latest developments in robotics. The event uses the format of a traditional entertaining science "show" which is broken down into a series of short dramatic vignettes to highlight important practical, personal and social issues relating to robotics, allowing the audience to get involved in a discussion about the latest advances in robotics and the implications of robotics on future society. Following a successful pilot version, which involved a partnership between the University of the West of England and At-Bristol, funding was received to roll the project out nationally over 2006-7.

Four robotics laboratories were involved in the rollout:

- the Intelligent Robotics Group at Aberystwyth University
- the Robotics Outreach Group at the Open University
- the Cricket Lab a the School of Informatics at the University of Edinburgh
- the Bristol Robotics Laboratory at UWE, Bristol

The partner venues for the programme were:

- At-Bristol (Bristol)
- Centre for Life (Newcastle)
- Techniquest (Cardiff)
- Techniquest@NEWI (Wrexham)
- Thinktank Science Museum (Birmingham)
- Science Museum (London)
- whowhatwherewhenwhy W5 (Belfast)
- Edinburgh International Science Festival (Edinburgh)

Each of the four research groups were partnered with two science centres (or, in the case of the University of Edinburgh, one science centre and Edinburgh International Science Festival). Each 'leg' of the project took place over a different time frame (as summarised later in this report), but all had similar elements which were organised and facilitated by the management team at UWE:

- Lab visit(s)
- Script writing
- Presenter training
- Shows
- Wraparound activities

Firstly a **lab visit** was organised where science centre staff responsible for developing and delivering the show would visit the robotics lab. Ideas for the show were discussed and it was an opportunity to gain background information on some of the science and engineering that would comprise the show.

Following the lab visit(s), UWE supported the science centre in **script writing** by providing consultancy paid for by the project. The script from the pilot project was used as a starting point, then adapted to incorporate the specific research interests of the partner group and other ideas that the partner venues wished to include.

After the script was developed, UWE provided **presenter training** for 2-8 members of science centre staff. In the case of the science festival, presenters were recruited separately. Based on the experience of the pilot project, specific training was deemed necessary due to the nature of the activity: rather than a straightforward demonstration show, Robot Thought included a number of discursive elements that required a different approach.

The Robot Thought **shows** were then delivered at each of the partner venues. In addition, all of the venues involved chose to develop **wraparound activities** such as 'make-and-take' workshops or 'meet the roboticist' informal discussion opportunities. Some science centres also instigated a centre-wide robotics theme during the project delivery period at their venue.

2.2 Project aims

The project had the following aims:

- To use the popular Robot Thought event format to provoke comment and debate amongst family audiences about science and engineering related issues.
- To raise awareness of robotics related issues amongst the target audience.
- To build a network of contacts between robotics experts and centres of science communication (science centres and festivals) across the UK.
- To further develop the popular 'Robot Thought' event format to best suit performance at each of the partner venues, thereby encouraging long term inclusion of the event format and/or content in their programmes.
- To extend and enhance public engagement expertise within the robotics research community.
- To promote the successes of the event format to the wider science communication and robotics research communities.

3 Evaluation methodology

An external evaluator visited seven of the eight legs of the project; the first leg (At-Bristol) was excluded as the show had already been evaluated as part of the pilot. In addition, the venues were responsible for distributing questionnaires throughout their delivery periods.

Two **simple questionnaires** (one targeted at children and one at adults) were used to capture audience opinions of the shows (examples of these questionnaires are included as an addendum to this report). Partner venues had the option to add their own evaluation questions to these, which many did. Evaluating the workshops was less straightforward as they differed widely in type and number between venues. Observation and informal interviews with visitors were used to gauge their success.

Following each leg, **telephone interviews** with project partners were conducted to identify the successes and challenges with each leg of the project.

These data were written up into a pair of **brief reports** for each leg of the project: one report summarised the audience questionnaire data, the other highlighted the successes and challenges of the leg from the perspectives of the project partners and made recommendations for the remainder of the project. This allowed learning to be incorporated into future legs of the project. The individual reports are available at http://www.scu.uwe.ac.uk/projects/evaluations/robot_thoughtII.htm

4 Evaluation sample

Audience evaluation of the *Robot Thought* show was obtained using a short questionnaire (n=525) for 12 and unders, and a long questionnaire (n=358) for older children and adults. A copy of the questionnaires is provided as an annex to this report. In addition, brief semi-structured interviews were held with both audience members and key representatives of each of the partner organisations involved.

5 Metrics

The table below summarises the audience sizes for each leg of the project.

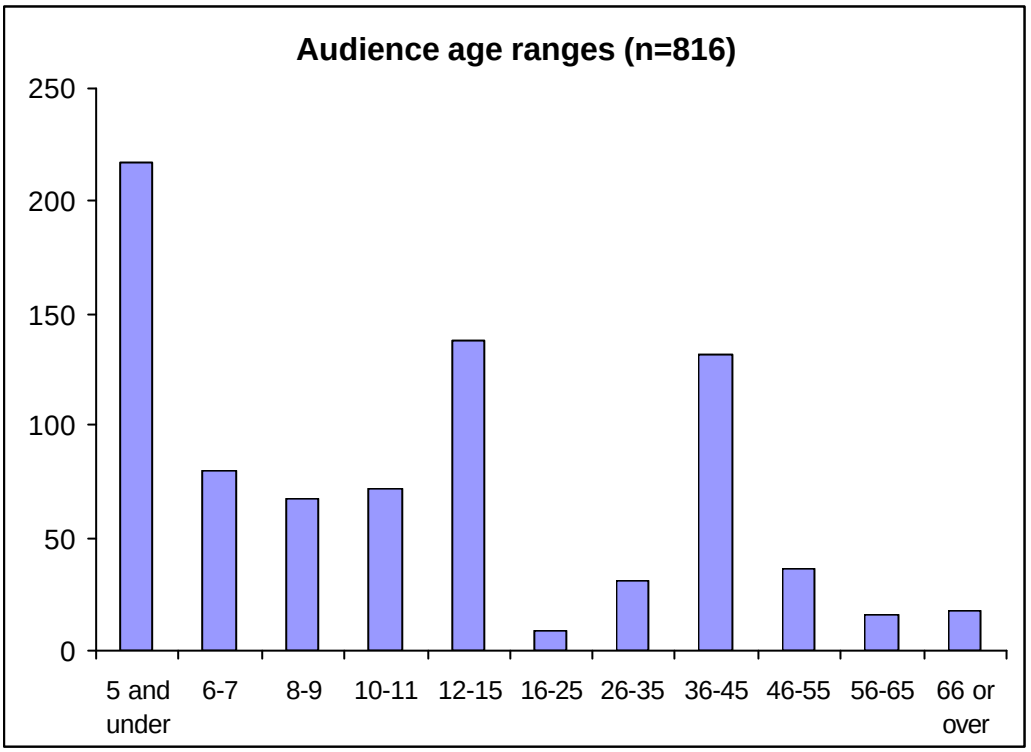
Science Centre or Festival	Robotics Research Group	Dates	No. shows	No. workshops	Show audience size	Workshop audience size
At-Bristol	University of the West of England, Bristol	July – August 2005	>50	>70	5353	11500
Science Museum, London	University of Wales, Aberystwyth	May - June 2006	18	10	1471	665
Thinktank, Birmingham	University of the West of England, Bristol	October - January 2006-7	51	73	3300	820
Techniquest, Cardiff	Open University	February 2007	30	9 days	4000	>1200
Edinburgh International Science Festival	Edinburgh University	April 2007	4	5	515	3854
W5, Belfast	Open University	May 2007 onwards	55	3	7493	212
Techniquest @ NEWI, Wrexham	University of Wales, Aberystwyth	May - June 2007	17	7 days	1000	1000
Centre for Life, Newcastle	Edinburgh University	October – November 2007	50	16	3237	320
Totals			**>275**	**>190**	**26369**	**>19571**

Note that the methods of counting audience numbers varied somewhat between venues, therefore the audience sizes shown are self-reported values. In addition, the definition of 'workshop' varied between venues: some were scheduled events at specific times and others were drop-in sessions that ran informally throughout the day.

6 Respondent demographics

A total of 883 questionnaires were collected, which represents a sample of just over 4% of the total show audience.

The graph below shows the distribution of ages in the sample:



As expected, the age ranges correspond to the family audience at which the show was targeted. The 12-15 age group is overrepresented due to the large number of questionnaires collected from secondary school groups that attended the shows at W5.

Although the show was designed to appeal to a 7+ age group at most centres, it is clear that a significant proportion of the audience were 5 years old or younger. The nature of the family audience meant that siblings with a potentially wide age range would attend the centres (and shows) together.

The gender balance overall was 47% male 53% female. However this masked a gender imbalance for the different age groups: for the younger questionnaire respondents the balance was 54% male 46% female, while for the older audiences it was 37% male 63% female. This could mean that mothers are more likely to attend science centres with their children, or that males prefer not to complete questionnaires…

Respondents were also asked to state their ethnic group and origin. Results are presented in the table below.

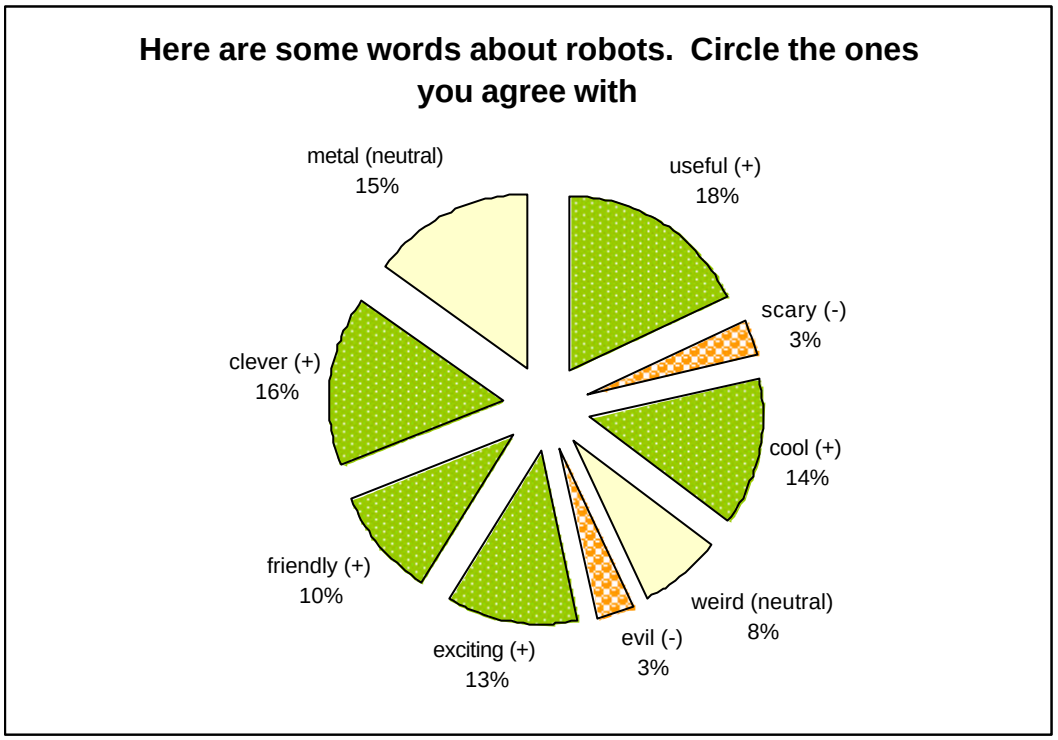
Ethnic group and origin	% response
White – British	78
White – Irish	12
White - Other White Background	3
Black – African	1
Black – Caribbean	
Black - Other Black Background	
Asian - Indian	1
Asian - Pakistani	
Asian - Bangladeshi	
Asian - Other Asian Background	
Mixed - White and Black Caribbean	1
Mixed - White and Black African	
Mixed - White and Asian	
Mixed - Other Mixed Background	1
Other - Chinese	
Other - Other Ethnic Group	1
Prefer not to state	1

As the table shows, respondents were predominantly White.

7 Audience survey findings

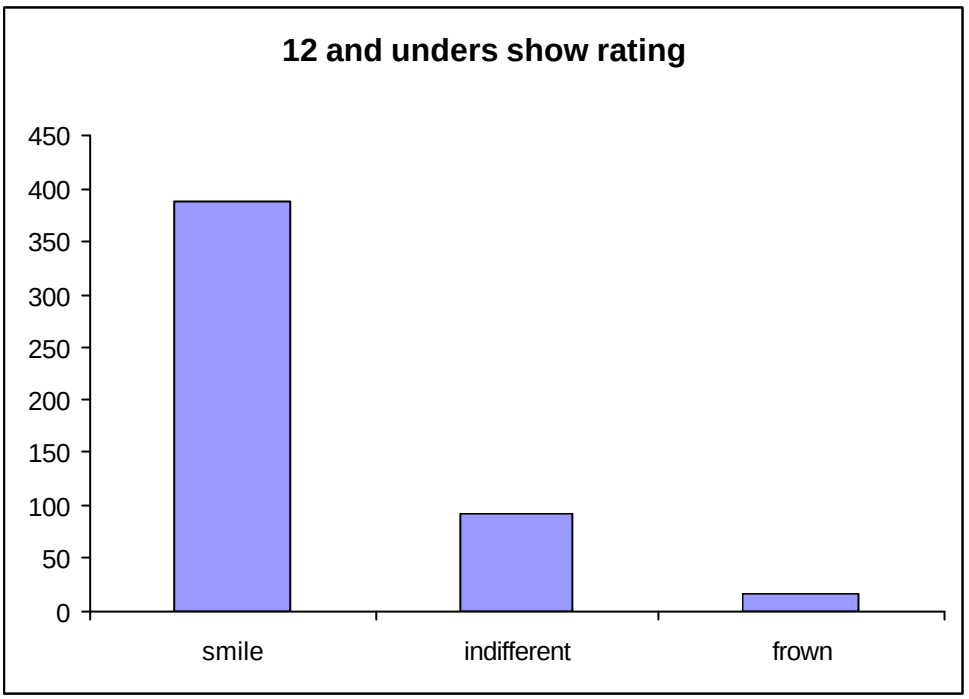
7.1 Short questionnaire (12 and unders)

Respondents were asked to circle which words they felt related to robots. Results are summarised in the chart below.



It is clear that more students circled the words with positive connotations than those with negative connotations.

Short questionnaire respondents were asked to rate the show using a three point smiley-face scale. Results are presented below:



78% of young people surveyed circled the smiley face. Comments in the open section of the form included:

"It was very interesting and you got to participate"

"Very interesting perhaps if you got more robots it would be better"

"I thought it was very good and very funny but still at the same time you learnt something"

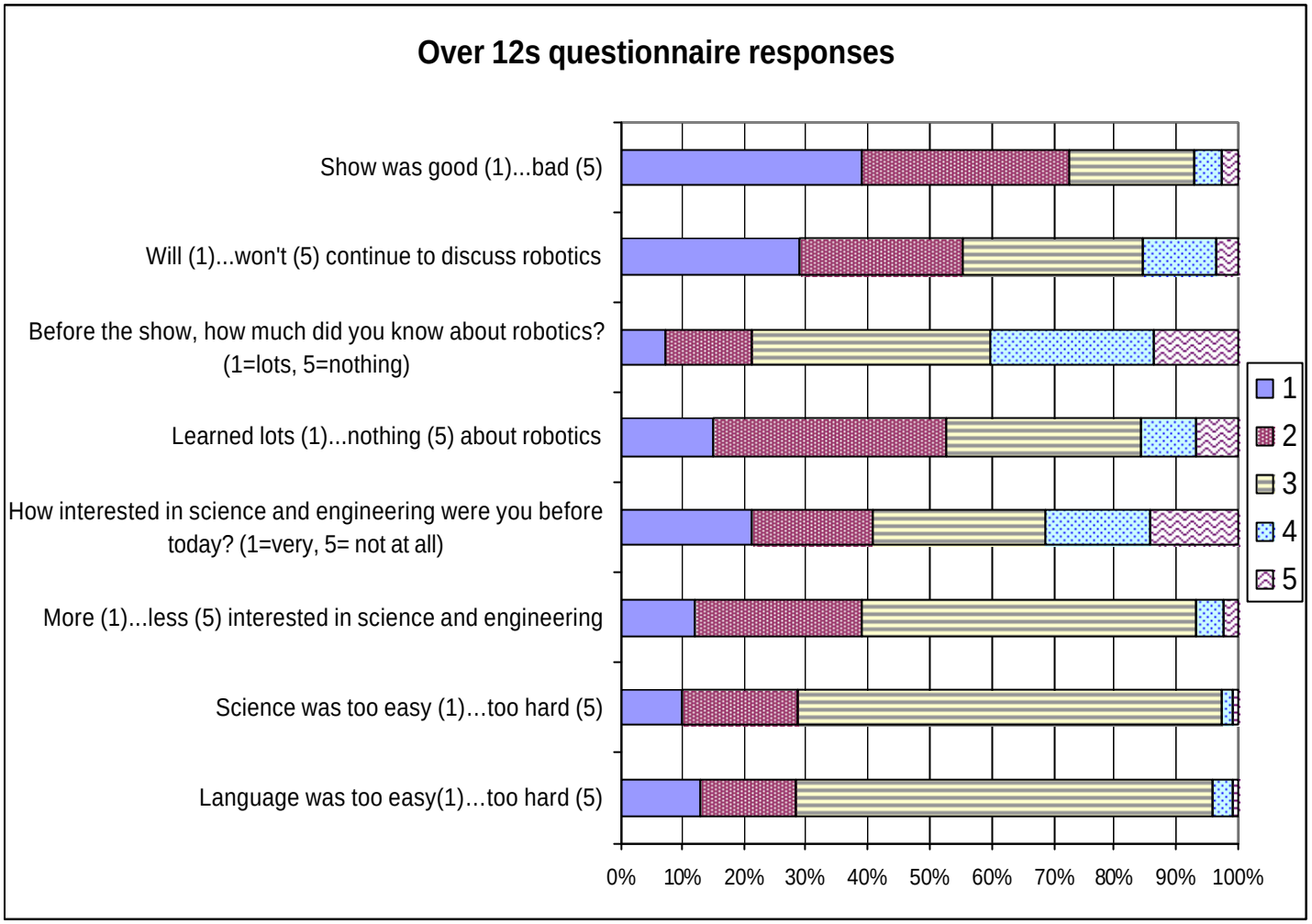
"I thought it was good and interesting most of all I liked the real robots"

"I found it very interesting cos I didn't know I had robots in my house!"

"I thought the show was interesting and it made you think"

7.2 Long questionnaire (Over 12s)

Responses to the quantitative questions are summarised in the graph below:



- Most (73%) rated the show as 1 or 2 on a five-point scale from good to bad. 20% rated is as 3.
- Two-thirds (69%) said that the science was pitched at the right level. One quarter (29%) felt it was 'too easy'.
- Two-thirds (68%) felt that the language was at the right level, although a quarter (29%) found it 'too easy'.
- Over half of respondents (55%) said they were very/quite likely to continue to discuss robotics after the show.
- Respondents' prior knowledge of robotics varied. On a scale of 1 (lots) to 5 (nothing), 21% rated their knowledge as 1 or 2, 38% as 3, and 41% as 4 or 5.
- Respondents were asked to rate how much they had learned about robotics on a scale from 1 (lots) to 5 (nothing). Over half (52%) rated their learning as 1 or 2, equivalent to a relatively large amount of learning, with a third (32%) rating their learning as 3. Only 7% of adults felt they learned nothing from the show.

- Two-thirds of the audience (69%) rated their prior interest in science as 1-3 on a scale of 1 (really interested) to 5 (not at all interested). 14% rated their interest as 5 – not at all interested.
- Over a third (39%) said that the show had made them more interested in science, with over half (54%) reporting no change. However given that two thirds of the audience were already interested in science, this is not surprising.
- When asked if the show had changed how they felt about robotics, over half said it had (52%). Many said the show had stimulated a greater interest in the field. Other comments included:

  "Generated a wiser interest as how we can explore robots at home"

  "They were more stupid than I thought"

  "Yes possible to discuss robotics in a fun way"

  "Still not sure if a washing machine is one"

  "Has given me a greater appreciation of the diversity of robotic science"

  "Yes because before I just saw them as toys"

  "They're helpful they're not machines that are like in the movies"

  "Made me think"

  "They have a long way to go yet"

  "Learnt how much more impact they can have on our daily life"

  "Work is ongoing to constantly improve our knowledge of outside world"

  "I think the amount of discussion was about right. You could discuss things if you wanted, or listen to others"

8 Organisers' successes and challenges

8.1 Successes

- Some of the centres had not worked with researchers before. All of the collaborations were reported as being beneficial.
- Allowing the presenters to visit the robotics labs boosted their confidence in the science and engineering, and inspired them with the project.
- Shows that involved lots of 'real' robots (i.e. research robots) were particularly well received by audiences.
- Another success factor for the show was using a strong definition of a robot throughout. This gave the audience a framework in which to think about the issues raised.
- The collaborations worked best when the different partners played to their strengths. For example, roboticists are not used to presenting to family audiences and do not have the time to rehearse shows, so including them in the show itself did not work well. However, the roboticists' knowledge was incredibly valuable in workshops and "Meet the Roboticist" events, where they could answer questions and start discussions with visitors. Science Centre staff didn't have the depth of knowledge to feel comfortable in this role, so the result was that both scientists and presenters could add to the visitors' experiences of the project in different ways.
- The role of UWE in brokering the partnerships and providing support throughout was seen as valuable by all. Indeed, several science centre staff and roboticists commented during interviews that there was no way they would have found each other or worked together had this facilitation not taken place.
- The show provided an overview of the key issues and current thinking in robotics. This allowed visitors to engage in informed dialogue with roboticists in subsequent sessions.
- All of the centres extended the programme beyond their initial commitment. This allowed the project messages to reach a large audience.
- Several centres adopted a "robots" theme throughout their venue during the show's run, in addition to developing wraparound workshops that ranged from mask making to storytelling.
- Several centres have committed to using the show as part of their standard programme, so its impact will extend beyond the lifetime of the funding.
- Several science centre / research group partnerships are keen to collaborate again in future.
- Many of the researchers involved in the project have built their skills and experience in public engagement and are keen to do more in future.
- For one research group, the demonstrations developed for Robot Thought are now in use as part of their departmental outreach offering, again extending the project's impact.

8.2 Challenges

- Staff turnover meant that more preparation would have been desirable at some science centres.
- The discursive approach within the show was new to many of the presenters. This needed to be carefully balanced with a good pace and lots of demonstrations to ensure the show succeeded.
- Linked to the above point, the show was quite different to what some audiences expected from a science centre show, so managing audience expectations was crucial.
- While including research robots in the shows was a success factor, these robots were considerably less reliable than the usual demonstrations the presenters used. The possibility that they could not work on stage was especially difficult for some of the teams.
- Where the science centres and robotics researchers were far apart geographically there were problems with shipping equipment and organising rehearsal time.
- As ever with public engagement, the scientists' time was a challenge. The days when roboticists were present at the centres to participate in shows or wraparound activities were necessarily limited. The central support from UWE helped address this to some extent; by taking on much of the organisation, the roboticists' could spend the maximum proportion of the time they had dedicated to the project actually engaging with the public.
- Audience sizes and even venues varied widely between shows at the same centre, so ensuring the show was flexible enough to work every time was a challenge. It was especially tricky to run the discursive parts of the show (that require lots of audience involvement) with very small audiences.

9 Conclusions

The project reached over 26,000 people and as such represented excellent value for money. Its impact will continue beyond the funded period as centres continue to deliver the shows.

However, possibly more valuable are the partnerships that formed during the project, which are highly likely to lead to future collaborations and public engagement activities. None of the scientists and science centres had worked together before and the support and guidance provided by the central project team helped ensure that this first such partnership was a successful one. Several science centre staff commented that they would like to build on the relationships developed during the course of the project or that they would consider approaching research groups or science centres in future.

OFFICE USE: Date of show……..... Time of show…… Qre no…….....

Over 12s – what do you think about robots?

Please take a few moments to tell us your thoughts on today's event. Your comments will help us improve future activities. Thanks!

These questions are about the show

1. How did you hear about the robots show?

2. Why did you decide to come to the show?

3. Please write down ***three words*** that describe the show

4. Please circle the number on the scale that describes what you thought of the show:

Show was ***good***	1	2	3	4	5	Show was ***bad***
Science was ***too easy***	1	2	3	4	5	Science was ***too hard***
Language was ***too easy***	1	2	3	4	5	Language was ***too hard***

5. What was the ***best bit*** of the show? Why?

6. What was the ***worst bit*** of the show? Why?

7. Do you think you will ***continue to discuss*** robotics after today's show?

Definitely will	1	2	3	4	5	Definitely won't

These questions are about the show's impact on you

8. Before the show, ***how much did you know about robotics***?

I knew lots	1	2	3	4	5	I knew nothing

9. How much do you think you have ***learned about robotics*** today?

I learned lots	1	2	3	4	5	I learned nothing

10. Please write down ***one thing you learned*** from the show

11. Has the show changed how you ***feel about robotics***? In what way?

Please turn over

12. How ***interested in science and engineering*** were you before today?

I was really interested 1 2 3 4 5 I was not at all interested

13. Has the show changed how you ***feel about science and engineering***?

Much more interested 1 2 3 4 5 Much less interested

14. Do you have any suggestions for improvement, or other comments about the show or robotics generally?

These questions are about you

15. What is ***your age***:

? Under 16 (please state) …… ? 16-25 ? 26-35

? 36-45 ? 46-55 ? 56-65 ? 66+

16. Who are you ***here with today***?

? Family ? School ? Friends ? Partner ? Alone

? Other (please state)……

17. If you are ***accompanying children***, please indicate how many and their age range:

Number of children……...

Age range/s (years) ? 0-3 ? 4-7 ? 8-11 ? 12-15 ? 16+

18. What is ***your gender***:

? Male ? Female

19. Please state your ***ethnic group and origin***:

? White – British
? White – Irish
? White - Other White Background
? Black – African
? Black – Caribbean
? Black - Other Black Background
? Asian - Indian
? Asian - Pakistani
? Asian - Bangladeshi
? Asian - Other Asian Background
? Mixed - White and Black Caribbean
? Mixed - White and Black African
? Mixed - White and Asian
? Mixed - Other Mixed Background
? Other - Chinese
? Other - Other Ethnic Group
? Prefer not to state

20. Do you consider yourself to be a ***disabled person***? (Y/N) .....

21. If so, please specify the ***nature of your impairment*** ……

22. What is ***your occupation***? .....

23. What is the first part of your ***postcode***? ……
(if you are an international visitor please write the name of your ***country***)

24. Have you been to Edinburgh International Science Festival before? (Y/N) .....

Thanks!

12 and under - What do you think about robots?

1. Here are some **words about robots**.
Circle the ones you agree with:

useful scary metal

friendly cool

clever weird

exciting evil

Write some more words if you like:

……

……

……

2. Did you like the **robots show**? Please circle one face:

☺ 😐 ☹

3. Tell us what you **thought about the show**:

……

……

4. Circle one: are you… male female

5. How old are you? Please write your **age** …… years

6. Please write the first part of your **postcode** (e.g. EH1) here……

(or write the name of your **country** if you are an international visitor)

7. Have you been to Edinburgh International Science Festival before?

Please circle: Yes No

THANKS!